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Triple heart image – one heart beats as three

Ivan Fauchère, MD; Rolf Jenni, MD MSEE; Felix C. Tanner, MD

Cardiology, Cardiovascular Center, University Hospital Zürich, Switzerland

Center for Integrative Human Physiology, University of Zürich, Switzerland

Felix C. Tanner, MD

Cardiology, Cardiovascular Center, University Hospital Zürich

Rämistrasse 100, CH-8091 Zürich

Phone +41 44 255 99 97

Fax +41 44 255 49 04

Email felix.tanner@access.uzh.ch

Image Focus:

A 69 year old patient with dilated cardiomyopathy and severe mitral regurgitation due to annulus dilatation was evaluated for mitral valve reconstruction. Transesophageal echocardiography showed a surprising finding with a triplication of all cardiac structures, demonstrating well separated ghost images, most evident at the level of the aortic valve (Panel A; Loop 1 and 2) and mitral valve (Panel B; Loop 3 and 4). The triplication was observed in all the views of the transesophageal study including the transgastric position (Panel C; Loop 5 and 6). In contrast, no triplication occurred in any of the transthoracic images. Triplication was also observed with color Doppler images (loop 2, 4, and 6) and persisted irrespective of changes in position and angle of the transducer, depth of the field, or respiratory maneuvers, making it difficult to determine the original image. The triplicated structures were located at similar angles and distance from the transducer, suggesting refraction as the cause of the artefact.

Although the generation of multiple ghost images caused by refraction is well understood theoretically and the echocardiographic duplication of cardiac structures by ultrasound refraction has been described in the literature, such an obvious image of triplication has not yet been documented. As this study demonstrates, triplication artifacts involving one original image and two ghost images can occur with both B-mode and color Doppler signals.

It is important to document the existence of such artefacts and to understand the underlying mechanism in order to avoid misinterpretation in less obvious situations.

Figure legend:**Panel A**

Short-axis (A1) and long-axis (A2) view of the aortic valve in enddiastole seen in a transesophageal view at 81° and 157°, respectively. Triplication of the aortic valve can be seen.

Panel B

Long-axis view with triplication of the mitral valve in a transesophageal view at 145° without (B1) and with (B2) color Doppler signal.

Panel C

Short-axis view with triplication of the mitral valve in a transgastric view at 0° without (C1) and with (C2) color Doppler signal.

